

CLAIMS

1. A targeting peptide comprising an amino acid sequence selected from the group consisting of:
AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLLHH, NIIPAPT,
5 SPTYPRR, TRSQPPL, NTGPNRV, PPPDWTF, SHFSLR, AFNYPPH, DFLQVSP, SPDHLFC,
LEHPPTT, TYPSEW, IPMHLHN, TSESPTV, YLSRSL, NHLALY, TYLSKA, TSTMPSR,
ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI,
WNSTTQA, HFTHPTH, AGATAMS, STYPIR, SWNHARV, NHHWGG, GILSPSH, EAVPTYS,
INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP,
10 KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHS, SLPRNSD, GYQQVFQ,
MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNS, VSGMSVPVQLAR,
MTQTPTTPWPDP, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPTST,
MTGSQQLHPPP, MATQPLSGSRLSG, MNMTPPPHSPPK, MTPFPTSNEANL,
AMSMITMHPSPN, MSDLLIEYPPYI, MTLPHLRDGL, AAVPPPYVMSRP,
15 MSQTPYARQYV, MTSNPHLNPGR, MGHNINIRPTPL, LSTPLPYDMRRS,
MTRIQDSPLYDLR, MSTPIREQAAH, MTNLPTVTQFP, MTPIATSIPPQM, MTPPTPIPSLPQ,
MTSPHPQTPLNT, MTQQPPLPHPAK, LAKPLPTTSNTG, LSKPIHIPSSIG, CICRGVGCCLL,
LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNS,
AQAMANPLGSHI, SSRIPGFPDPLH, SMRGLPELNRI, MSSPTVSAPQY, VLSMQTPPTPLL,
20 THAMSHLDKAH, MAVQPNTSTSN, MAINDTYPPRP, MPPPTSLPSPS, LAQNPIYRAHPH,
MQRPQTLPAS, LTVPVVSFAVH, LTFSTPLNPR, MAGQPKDSSKTL, ANTPPHILSTE,
MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, for targeting a material to a cell.
- 25 2. A targeting peptide according to claim 1 wherein said peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNV, LSNFHS, GILSPSH MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

3. A targeting peptide according to claim 1 wherein said peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNVT, LSNFHSS, GILSPSH and MSSPGPA, or a derivate thereof.

4. A targeting peptide according to claim 1 wherein said peptide comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivate thereof.

5. A targeting peptide according to claim 1 wherein said peptide is up to 100 amino acids long.

6. A targeting peptide according to claim 1 wherein said cell is a vascular endothelial cell.

7. A targeting peptide according to claim 1 wherein said material to be targeted to a cell is selected from the group consisting of drug delivery vehicles, gene therapy vehicles, bacteria, non-ionic surfactant vesicles, microcapsules and vaccination products.

8. A pharmaceutical composition comprising a targeting peptide in association with a vehicle, the targeting peptide comprising an amino acid sequence selected from the group consisting of:

AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSEW, IPMHLHN, TSESPTV, YLSRSL, NHLALY, TYSLSA, TSTMPSP, ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPTH, AGATAMS, STYPIIR, SWNHARV, NHHWGGL, GILSPSH, EAVPTYS, INSNAFG, YSTHSTR, SLDLTVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAEFTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQVVFQ, MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNS, VSGMSVPVQLAR,

MTQTPRTTPWPD,	MSLTTPPAVARP,	MSNNPIRPPTSG,	MTQVYTPPPTST,
MTGSQQLHPPP,	MATQPLSGSRLSG,	MNMTPPHSPK,	MTPFPTSNEANL,
AMSMTTPHSPN,	MSDLLIEYPPI,	MTLPHELRLDGL,	AAVPPPYVMSRP,
MSQTPYARPQYV,	MTSNPHLNPGR,	MGHNINIPRTPL,	LSTPLPYDMRRS,

- 5 MTRIQDSPYDLR, MSTPIREQAAH, MTNLPTVTQFPP, MTPATSIPTQM, MTPPTPIPSLPQ, MTSHPHQTPLNLT, MTQQPPLPHPAK, LAKPLPTTSNTG, LSKPIHIPSSIG, CICRGVGCCLLL, LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS, AQAMANPLGSHI, SSRIPGFDPDLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLSMQTPPTPLL, THAMSHLDKAH, MAVQPPNTSTSN, MAINDTYPPRP, MMPPTSLPSPS, LAQNPIYRAHPH,
- 10 MQPRPQTLTPAS, LTPVPVVSFAVH, LTPFSTPLNPR, MAGQPKDSSKTL, ANTPPHITLSTE, MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, the vehicle carrying a pharmaceutically active agent, and a pharmaceutically acceptable carrier.

9. A pharmaceutical composition according to claim 8 wherein said peptide
- 15 comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS, GILSPSH MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivate thereof.

10. A pharmaceutical composition according to claim 8 wherein said peptide
- 20 comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS, GILSPSH and MSSPGPA, or a derivate thereof.

11. A pharmaceutical composition according to claim 8 wherein said peptide
- comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP,
- 25 MTPFPTSNEANL and MGMTVPENLIVQ, or a derivate thereof.

12. A pharmaceutical composition according to claim 8 wherein said peptide is up to 100 amino acids long.

13. A pharmaceutical composition according to claim 8 wherein said pharmaceutically active agent is selected from the group consisting of a biologically active drug, a further peptide(s) and polynucleic acid.

5 14. A pharmaceutical composition according to claim 8 wherein the targeting peptide is in direct association with the vehicle carrying a pharmaceutically active agent.

15. A pharmaceutical composition according to claim 8 wherein the targeting peptide is indirectly associated with the vehicle carrying the pharmaceutically active agent.

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16. A pharmaceutical composition according to claim 8 wherein the targeting peptide is covalently bound to the pharmaceutically active agent.

15 17. A pharmaceutical composition according to claim 8 wherein said composition is used to treat mammals.

18. A pharmaceutical composition according to claim 17 wherein said composition is used to treat humans.

20 19. A method of targeting a material to cell, said method comprising bringing into association a targeting peptide comprising amino acid sequence selected from the group consisting of:

AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLH, NIIPAPT,
SPTYPRR, TRSQPLL, NTGPNRV, PPPDWTF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC,
25 LEHPPTT, TYPSEW, IPMHLHN, TSESPTV, YSLSRSL, NHLALY, TYSLSKA, TSTMPSP,
ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI,
WNSTTQA, HFTHPH, AGATAMS, STYPIR, SWNHARV, NWHGGL, GILSPSH, EAVPTY, S,
INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP,
KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ,

- MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR,
 MTQTPTTPPWPDP, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPTST,
 MTGSQQTLHPPP, MATQPLSGSRLSG, MNMTPPPHSPK, MTPFPTSNEANL,
 AMSMTMPHSPN, MSDLLIEYPPYI, MTLPHELRDGAL, AAVPPPYVMSRP,
- 5 MSQTPYARQYV, MTSNPHLNPGPR, MGHNINIRPTL, LSTPLPYDMRRS,
 MTRIQDSPYDLR, MSTPPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPPTPIPSLPQ,
 MTSPHPQTPLNT, MTQQPPLPHPAK, LAKPLPTTSNTG, LSKPIHIPSSIG, CICRGVGCCLL,
 LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMQPQAHNNNS,
 AQAMANPLGSHI, SSRIPGFPDPLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLSMQTPPTPLL,
- 10 THAMSHLDKAH, MAVQPPNTSTSN, MAINDTYPPRP, MPPPTSLPSPS, LAQNPIYRAHPH,
 MQPRPQTLTPAS, LTVPVVSVFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHITLSTE,
 MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, with the material to be
 targeted to form a complex and exposing the complex to a cell(s).
- 15 20. A method according to claim 19 wherein said targeting peptide comprises an
 amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS,
 GILSPSH MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a
 derivate thereof.
- 20 21. A method according to claim 19 wherein said targeting peptide comprises an
 amino acid sequence selected from the group consisting of SIGYPLP, NTGPNRV, LSNFHSS,
 GILSPSH and MSPPGPA or a derivative thereof.
- 25 22. A method according to claim 19 wherein said targeting peptide comprises an
 amino acid sequence selected from the group consisting of MSLTTPPAVARP,
 MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.
23. A method according to claim 19 wherein said targeting peptide is up to 100
 amino acids long.

24. A method according to claim 19 wherein the cell to be targeted is a endothelial cell.
- 5 25. A method according to claim 19 wherein said endothelial cell is a vascular endothelial cell.
26. A method according to claim 19 wherein said method is performed *in vivo*.
- 10 27. A method according to claim 26 wherein said method is used to target a material selected from the group consisting of drug delivery vehicles, gene therapy vehicles, bacteria, non-ionic surfactant vesicles, microcapsules and vaccine products.
28. A kit comprising a targeting peptide comprising an amino acid sequence
- 15 selected from the group consisting of: AASARLP, VYFPAPN, FSMSTPS, IVAQPR, FPQTYTT, NIAAFSL, QPRLLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWT, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSSSEW, IPMHLHN, TSESPTV, YLSRSL, NHLALY, TYSLKSA, TSTMPSR, ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPTH, AGATAMS, STYPIIR, SWNHARV,
- 20 NWHHGG, GILSPSH, EAVPTYS, INSNAPG, YSTHSTR, SLDATVR, INSVSPH, MSSPGPA, LPTKTLF, AAWPTSS, LTAELTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ, MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR, MTQTPRTTPWPD, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPTST, MTGSQQLHPPP, MATQPLSGSRLSG, MNMTPPHSPPK,
- 25 MTPPTSNEANL, AMSMTMPHSPN, MSDLLIEYPPYI, MTLPHELRDGAL, AAVPPYVMSRP, MSQTPYARPQYV, MTSNPHLNPGR, MGHNINIRPTPL, LSTPLPYDMRRS, MTRIQDSPLYDLR, MSTPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPPTPIPSLPQ, MTSHPHQTPLNT, MTQQPLPHPAK, LAKPLTTSNTG, LSKPIHIPSSIG, CICRGVGCCLLL, LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS,

AQAMANPLGSHI, SSRIPGFPDPLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLSMQTPPTPLL, THAMSHLDKAH, MAVQPPNTSTSN, MAINDTYPPPRP, MMPPTSLSPPS, LAQNPIYRAHPH, MQPRPQTLTPAS, LTPVPVVSFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHTILSTE, MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, for transfecting or identifying cell types *in vitro*.

29. A kit according to claim 28 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS, GILSPSH MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivate thereof.

30. A kit according to claim 28 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNRV, LSNFHSS, GILSPSH and MSPPGPA or a derivative thereof.

31. A kit according to claim 28 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

32. A kit according to claim 28 wherein said targeting peptide is up to 100 amino acids long.

33. A kit according to claim 28 wherein said targeting peptide further comprises a linking region for binding molecular groups.

34. A kit according to claim 33 wherein said molecular groups are selected from the group consisting of reagents, pharmaceutically active agents, vesicles, diagnostic markers and antibodies.

35. A method for screening targeting peptides capable of binding to an endothelial cell, said method comprising:

inserting a polynucleotide encoding a potential endothelial cell-binding peptide into an expression vector;

5 expressing the peptide;

conducting a pre-screening step with the expressed peptides using non-endothelial cells in order to select for the expressed peptides with reduced or negligible binding to the non-endothelial cells;

10 further screening the expressed peptides which exhibited reduced or negligible binding to the non-endothelial cells using endothelial cells; and

selecting for the expressed peptides which display selective and efficient binding to the endothelial cells.

36. A method according to claim 35 wherein said endothelial cells are human
15 endothelial cells.

37. A method according to claim 35 wherein said non-endothelial cells are selected from a group consisting on human vascular smooth muscle cells and hepatocytes.

20 38. A gene therapy vector, said vector comprising a targeting peptide as described in claim 1, a vehicle associated with the targeting peptide and a nucleotide sequence comprising the gene for targeting carried within said vehicle.

39. A method of treating a disease, said method comprising administering a
25 pharmaceutical agent in association with a targeting peptide, said targeting peptide comprising amino acid sequence selected from the group consisting of:

AASARLP, VYFPAPN, FSMSTPS, IVAQPRL, FPQTYTT, NIAAFSL, QPRLLHH, NIIPAPT, SPTYPRR, TRSQPPL, NTGPNRV, PPPDWTF, SHFSHLR, AFNYPPH, DFLQVSP, SPDHLFC, LEHPPTT, TYPSSSEW, IPMHLHN, TSESPVT, YSLSRSL, NHLALY, TYSLKSA, TSTMPSR,

- ETIKTNT, ATGFATP, TNSQPSP, TSFFMPP, TAAYRFW, LPPSLYS, SPSVVPF, HSLTFSI, WNSTTQA, HFTHPH, AGATAMS, STYPIIR, SWNHARV, NHHWGGL, GILSPSH, EAVPTYS, INSNAPG, YSTHSTR, SDLATVR, INSVSPH, MSSPGPA, LPKTLF, AAWPTSS, LTAELTP, KIDGTPR, VEPARAS, SIGYPLP, WTSDELH, TLGLHMS, LSNFHSS, SLPRNSD, GYQQVFQ,
- 5 MSPPGPA, LCMTTLV, SEVAVQG, MAMPQPADHNNS, VSGMSVPVQLAR, MTQTPRTTPWPD, MSLTTPPAVARP, MSNNPIRPPTSG, MTQVYTPPTST, MTGSQQTLHPPP, MATQPLSGSRLSG, MNMTPPPHSPPK, MTPFPTSNEANL, AMSMTTMPHSPN, MSDLLIEYPPYI, MTLPELDRDAL, AAVPPPYVMSRP, MSQTPYARPYV, MTSNPHLNPGR, MGHNINIRPTL, LSTPLPYDMRRS,
- 10 MTRIQDSPLYDLR, MSTPIREQAAH, MTNLPTVTQFPP, MTPIATSIPPQM, MTPTTPIPSLPQ, MTSPHPQTPNLT, MTQQPPLPHPAK, LAKPLTTSNTG, LSKPIHIPSSIG, CICRGVGCCLL, LQPPSMITHPST, LTPPNQVLNPLY, AFPMVGGPDHFR, MLMPQPAHHNNS, AQAMANPLGSHI, SSRIPGFDPDLH, SMRGLPELNPRI, MSSPTVSSAPQY, VLSMQTPPTPLL, THAMSHLDAK, MAVQPNTSTSN, MAINDTYPPRP, MPPPTSLPSPS, LAQNPIYRAHPH,
- 15 MQPRPQTLTPAS, LTVVPVVSFAVH, LTSPFSTPLNPR, MAGQPKDSSKTL, ANTPPHITLSTE, MGMTVPENLIVQ, and MTPIQSTQYPHS, or a derivative thereof, wherein said targeting peptide delivers the pharmaceutical agent for uptake by a target cell.

40. A method according to claim 39 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNTV, LSNFHSS, GILSPSH, MSSPGPA, MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

41. A method according to claim 39 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of SIGYPLP, NTGPNRV, LSNFHSS, GILSPSH and MSSPGPA or a derivative thereof.

42. A method according to claim 39 wherein said targeting peptide comprises an amino acid sequence selected from the group consisting of MSLTTPPAVARP, MTPFPTSNEANL and MGMTVPENLIVQ, or a derivative thereof.

5 43. A method according to claim 39 wherein said targeting peptide is up to 100 amino acids long.

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